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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/743,409	12/23/2003	Yoshikazu Hatada	2635-197	8041

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EXAMINER	
OLSEN, KAJ K	

ART UNIT	PAPER NUMBER
1753	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/743,409	HATADA ET AL.	
	Examiner	Art Unit	
	Kaj K. Olsen	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-28 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-28 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 1-22-07;12-23-03.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. On p. 8, l. 16, the examiner believes "170" should actually be --107--.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-5, 8-11, 13-19, 22-25, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1 006 351 (hereafter "EP '351") in view of Anzai (USP 4,112,893) or Kunimoto et al (USP 6,673,223), and Skoog (Principles of Instrumental Analysis, 1998, pp. 53-55) or Kato et al (USP 5,672,811), and Shirai et al (USP 5,150,189) or Stetter et al (USP 5,331,310). EP '351 is the EPO equivalent to the two US teachings of Hada cited by the applicant in the IDSs, but unlike the Hada teachings, it qualifies as prior art under 102(b).

4. EP '351 discloses a gas concentration measuring apparatus comprising a gas sensor 100 configured to measure a specified gas component and a measuring substrate where an electric circuit is formed, where said electric circuit being electrically connected to the gas sensor and including a signal processing circuit. See fig. 1 and paragraphs 0018 and 0039. Said circuit would inherently terminal (Vb, Vc) connected to the gas sensor, a conductive pattern portion having conductivity (e.g. the remaining electrical lines of fig. 7), an electrical component (e.g.

211, 221) mounted on the conductive pattern portion, and a signal input pattern constituting the signal processing circuit. See the circuitry of fig. 7 as well as paragraphs 0018 and 0039 that disclose that all the sensor circuitry is built upon the measurement substrate. EP '351 does not explicitly disclose a number of the additional features of the claims, in particular the high input impedance, the potential difference of 2 V or more, and the guard pattern. However, these various additional features of the claims are conventionally utilized in electronic circuitry and in prior art sensors as discussed below.

5. With respect to the use of the connection terminal has an input impedance of 500 kΩ or over. Anzai teaches that the input impedance for a gas sensor circuit should be high (including at least 1 MΩ) to as to have the input impedance of the circuit better match the impedance of the gas sensor, especially at low temperatures. See the abstract and col. 2, ll. 20-27. Kunimoto teaches that voltage measuring circuitry for gas sensors (EP '351 determines current by voltage measurements) should have a high impedance in comparison with the electrodes or, otherwise the voltage measurement will draw excessive current from the sensor. See col. 8, ll. 52-59. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teachings of either Anzai or Kunimoto and utilize a high input impedance (including over 500 kΩ) for the circuitry of EP '351 so as to better match the impedance of the sensor and to ensure that excessive currents are not drawn from the already low current sensor of EP '351. With respect to the signal input pattern having an impedance that is less that 10% of the connection impedance, EP '351 already stresses that the conductive elements of the circuit are conducting low current signals (paragraph 0038). Because current flow will be inversely proportional to the impedance of the conductive elements (via Ohm's Law), one would have

been motivated to utilize low impedance conductive elements in order to maintain the sensor signal. This coupled with the already set forth motivation to utilize very high impedance input terminal (see Anzai and Kunimoto above) would lead one possessing ordinary skill in the to utilize signal input patterns that have an impedance that is at least less than 10 percent than the high input impedance and less than 2 kΩ in order to keep the measurement signal with as high a current level as is possible.

6. With respect to the presence of a different potential pattern having a potential difference of 2 V or over from the signal input pattern, EP '351 does not explicitly disclose the voltages being applied to the various circuitry elements. However, EP '351 discloses the use of operational amplifiers (211, 221) and Skoog teaches that operational amplifiers require an external power supply to operate, which is typically ±15 V DC. See pp. 53 and 54. Furthermore, EP '351 also includes the heater circuitry on the substrate (paragraph 0039) and Kato teaches that heaters are conventionally supplied with 12 V of power. See col. 16, ll. 34-38. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize either of the teachings of Skoog or Kato to the apparatus of EP '351 so as to provide the power source for the operational amplifiers or the heater to the substrate containing the operational amplifiers and heater controls. With respect to a potential difference of 2 V or more, the voltage being applied to the signal input line would be much less that 12 or ±15 V (see Kato, col. 15, ll. 42-47 where only 450 mV of potential is generated at the measuring electrode), and at least 2 V or 4V of difference in voltage would clearly be present.

7. With respect to the presence of a guard pattern, this is also a conventional practice known in the prior art. In particular, both Shirai and Stetter teaches that guard patterns having potential

substantially equal to the potential of the signal line (i.e. a potential difference of less than 0.5 V or 0.2 V) can be utilized for sensor signals so as to protect them from electrical interference. See the Shirai abstract and Stetter, col. 5, ll. 10-12 and col. 6, ll. 3-22. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of a guard pattern for sensor circuitry of EP '351 so as to protect the small sensor signal from electrical interference.

8. With respect to the further conductive pattern, any number of the conductive patterns shown in fig. 7 of EP '351 would read on the specified conductor. With respect to its specified impedance, as discussed above, all these various conductive elements should have negligible impedance in order to effectively transmit the small currents of EP '351 through the circuitry. An impedance of less than 500 Ω would have been an obvious choice of pattern having negligible impedance.

9. With respect to the guard pattern having a potential in the range of 80 to 120 percent of the potential of the signal input pattern, both Shirai and Stetter teach that the potential of the guard should be at the same potential (i.e. 100 %) as that of the signal pattern being protected. See the discussion above.

10. Claims 6, 7, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP '351 in view of Anzai or Kunimoto, and Skoog or Kato, and Shirai or Stetter as applied to claims 1 and 15 above, and further in view of Varker (USP 4,030,190).

11. With respect to the claims, the references set forth all the limitations of the claims, and EP '351 further set forth that the circuit could be constructed with a multilayered board (paragraph 0039). However, that doesn't explicitly anticipate the use of either a substrate being

between the signal input patterns and the different potential patterns (claims 6 and 20), or a plurality of conductive and insulating layers alternately laminated with each other (claims 7 and 21). Varker explicitly recites that multilayered circuits comprise substrate elements 11 placed between different conductive patterns (15, 17, 19) and comprise conductive layers and insulating layers alternately laminated together and provide higher density of circuits than is possible with single layer circuits. See fig. 1-5 and col. 1, ll. 11-19. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Varker for circuit of EP '351 in view of Anzai or Kunimoto, and Skoog or Kato, and Shirai or Stetter in order to garner a higher density circuit.

12. Claims 12 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP '351 in view of Anzai or Kunimoto, and Skoog or Kato, and Shirai or Stetter as applied to claims 1 and 15 above, and further in view of Mochizuki et al (USP 5,078,855).

13. The references set forth all the limitations of the claims, but did not explicitly recite the presence of circuit elements having portions with an insulating coating and portions with an exposed portion. Mochizuki teaches that circuits should be covered with an epoxy layer except for at the location of the connecting terminals for the circuit presumably to protect the circuit from deterioration and interferents. See fig. 5 and col. 3, ll. 64-68. This would read on the defined portions having an insulating coating and portions having an exposed portion (i.e. where the connecting terminals are). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Mochizuki for the apparatus of EP '351 in view of Anzai or Kunimoto, and Skoog or Kato, and Shirai or Stetter in order to protect the circuit from deterioration and interferents.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753
August 29, 2007

KAJ K. OLSEN
PRIMARY EXAMINER